

Summary and Recommendations

IAHR Long Waves Symposium in Honor of George Francis Carrier

Revised: 22 September 2003

1. The *Long Waves Symposium (LWS)* was held in Thessaloniki, Greece, August 25-27, 2003. The symposium was co-hosted by the Maritime Hydraulics Section of the International Association for Hydraulic Engineering and Research (IAHR) and the Coasts, Oceans, Ports, and Rivers Institute (COPRI) of the American Society of Civil Engineers (ASCE).
2. The symposium was dedicated to the memory of Dr. George Carrier, Harvard Professor and one of the world's preeminent applied mathematicians in the area of long waves who recently passed away. Dr. Harry Yeh, Oregon State University, presented a tribute during opening ceremonies of the LWS.
3. Authors presented over 33 papers on various aspects of long waves, including harbor resonance and tsunami waves, from 18 different countries.
4. The program also featured the presentation of the ASCE/COPRI 2003 International Coastal Engineering Award (ICCE) to Prof. Fredric Raichlen, Caltech Emeritus Professor. As a former student, Prof. Costas Synolakis introduced Prof. Raichlen and entertained us with several anecdotes on Prof. Raichlen's professional and mentoring activities over the years. Prof. Tony Dalrymple, President of COPRI, and Phil Liu, Maritime Hydraulics Section Head of IAHR, presented the award to Dr. Raichlen.
5. Dr. Raichlen presented a keynote address on the role of harbor resonance in port operations. Prof. Phil Liu presented a keynote on the modeling of tsunami generation, propagation and runup.
6. The proceedings were published and delivered to *LWS* participants. Additional copies can be obtained from Prof. P. Prinos at prinosp@civil.auth.gr or Prof. Chris Koutitas at koutitas@civil.auth.gr. The cost is 70 Euros (50 Euros for *LWS* participants wanting additional copies), plus 2.5 to 5.5 Euros for postage depending on destination, and includes the hard copy and CD Rom. Copies of the entire 30th IAHR Congress proceedings as hard copy and/or CD Rom can also be obtained from this site for 100 to 200 Euros plus shipping. A copy of the order form is attached as LWSorderform2.doc.
7. This summary and photographs of the three days of the LWS are temporarily located on the CHLGuest FTP site. Please contact Dr. Briggs at michael.j.briggs@erdc.usace.army.mil for instructions and password. Eventually, they will be on the symposium web site located at <http://www.civil.auth.gr/LWS2003/index.html>.
8. Modeling of earthquake and landslide-generated tsunami propagation is fairly advanced but could still benefit from a better understanding of wave breaking, wave-structure interaction, and integration of smaller scale models into larger scale models.
9. One of the most critical problems is defining and modeling the source region for tsunamis, both earthquake and landslide-generated. Seismologists and geotechnical engineers must directly participate in some of these activities.

10. Shallow water bathymetry is not always known very well. The modeling of tsunami runup could benefit from better measurements close to shore, in bays and harbors.
11. Although tsunami wave propagation and forcing is fairly well understood, a better understanding of the forcing mechanisms of long waves on harbor resonance is still required. We have come a long way relative to our understanding of short wave-wave interactions and the effects of bound and free waves. Atmospheric forcing was identified for certain meteorological conditions in the port of Rotterdam. This type of forcing may affect other harbors around the world.
12. Individual basins within a two-basin harbor were shown to affect each other and the total harbor response. Additional research might show a connection between the response of more complex harbors (such as the Los Angeles and Long Beach harbor) on the overall harbor resonance as a function of the response of individual basins.
13. We need better instrumentation and warning systems of long wave occurrences that might adversely affect harbors. These systems would be able to alert harbor pilots when long wave will cause a problem to harbor operations. More automated cargo handling systems could be built to handle long wave surge motions.
14. Improved wave absorption and breakwaters (active and passive) might help to reduce harbor resonance. We need to make sure that we do not exacerbate the problem.
15. We need to take all this information and present as a design guide and standards for harbors and coastal structures.
16. Everyone agreed that the *LWS* format was good since it allowed us to have more discussion of “works in progress” and not just “completed” work. It was good opportunity to understand long waves and low frequency phenomenon from different perspectives. The *LWS* permits sharing of knowledge and enhances communications between tsunami and harbor resonance groups within the long waves research community. Many participants noted that they had attended the *LWS* for the specific purpose of meeting with their peers and discussing long wave problems and solutions.
17. We need to always strive to have good benchmark problems to verify models.
18. The joint sponsorship was a good way to utilize synergy among our professional groups to find solutions to problems without becoming too fragmented with the proliferation of conferences.
19. Special thanks to our session chairs that included Drs. Demos Angelides, Jurgen Battjes, Michael Briggs, Robert Dalrymple, Bob Dean, Bill Kamphuis, Utku Kanoglu, Theophanis Karambas, Akira Kimura, Christopher Koutitas, Y. Krestenitis, Phil Liu, Etienne Mansard, Constantine Memos, Fredric Raichlen, Costas Synolakis, and Harry Yeh.
20. Dr. Michael Briggs, Coastal and Hydraulics Laboratory, chaired the International Advisory Committee that included Drs. Constantine Memos, National Technical University of Greece, Philip L.-F. Liu, Cornell University, Etienne Mansard, National Research Council of Canada, and Costas Synolakis, University of Southern California. Prof. Christopher Koutitas, Aristotle University of

Thessaloniki, chaired the local organizing committee that included Drs. Constantine Memos, National Technical University of Athens, P. Matsoukis, Democritus University of Trace, Th. Karambas, Technological Educational Institute of Serres, and G. Papadopoulos, National Observatory of Athens. Special thanks to all the hard-working committee members.